

USGS Maryland-Delaware-District of Columbia Water Science Center**Seminar Series****Wednesday, March 4, 2015 11:00 a.m.****Chemical Composition and Microbiology of Produced Waters from Pennsylvania Shale Gas Wells****Denise M. Akob, Research Microbiologist, U.S. Geological Survey, National Research Program, Reston, VA**

Produced waters (PW) from hydraulic fracturing of shales are comprised of injected fracturing fluids and natural formation waters in a mixture that changes over time. We characterized the organic compounds and microbial communities in PW samples from the separator tanks from 12 Marcellus and one Burket Shale wells. Microbial abundance was generally low (66 to 9400 cells/mL). Non-volatile dissolved organic carbon (NVDOC) was high (7-31 mg/L) relative to typical shallow groundwater and the presence of organic acids (e.g., acetate, formate, and pyruvate) indicated microbial activity. Volatile organic compounds (VOCs) were detected in four samples (~1-11.7 µg/L): benzene and toluene in the Burket sample, benzene in two Marcellus samples, and tetrachloroethylene (PCE) in one Marcellus sample. The source of the VOCs is unclear, although some can be naturally occurring they are also associated with industrial activity. Despite the addition of biocides during hydraulic fracturing, H₂S-producing, fermenting, and methanogenic bacteria were cultured from PW samples. Presence of culturable bacteria was not associated with salinity or location; although organic compound concentrations and production time were correlated with microbial activity. We provide multiple lines of evidence to indicate the presence and activity of microorganisms that could degrade the organic compounds present in PW.

**Biography**<https://profile.usgs.gov/dakob>

Dr. Denise M. Akob is a microbial ecologist whose research focuses on understanding how microorganisms impact their environment and biogeochemical cycles and in turn, how an environment impacts microorganisms. She investigates both contaminated and pristine environments. Her research focuses primarily on understanding microbial impacts on energy production, either by mitigating degradation of contaminants (from hydraulic fracturing or oil spills) or by enhancing microbial natural gas production. Dr. Akob received her undergraduate degree in Biology from St. Mary's College of Maryland. She completed her PhD in Biogeochemical Oceanography from Florida State University in 2008 and was a postdoctoral research fellow at Friedrich Schiller University Jena, Germany from 2008-2012. Dr. Akob joined the U.S. Geological Survey's National Research Program in 2012.

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